Mark Scheme (Results)

June 2022

Pearson BTEC Nationals
In Applied Human Biology (21325L)
Unit 1: Principles of Applied Human Biology

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Unit 1: Principles of Applied Human Biology

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Mark grids should be applied positively. Learners must be rewarded for what they have shown they can do rather than be penalised for omissions.
- Examiners should mark according to the mark grid, not according to their perception of where the grade boundaries may lie.
- All marks on the mark grid should be used appropriately.
- All the marks on the mark grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks, if the learner's response is not rewardable according to the mark grid.
- Where judgement is required, a mark grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the mark grid to a learner's response, a senior examiner should be consulted.
- Crossed-out work should be marked UNLESS the candidate has replaced it with an alternative response.
- Phonetic spelling should be accepted.

Specific marking guidance

The mark grids have been designed to assess learners' work holistically.

Rows in the grids identify the assessment focus/outcome being targeted. When using a mark grid, the 'best fit' approach should be used.

- Examiners should first make a holistic judgement on which band most closely matches the learner's response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band depending on how they have evidenced each of the descriptor bullet points.

Question number	Answer	Additional Guidance	Mark
1 (a)(i)	D peptide		(1)
1 (a)(ii)	D trypsin		(1)
1 (a)(iii)	Award **1** mark for identification and **1** mark for linked expansion. Up to a maximum of **2** marks. Any marking point can act as identification or expansion depending on how learners have structured their answer. restricted growth / decrease in muscle mass (1) (body absorbs) fewer/less amino acids (1) less protein can be {made/synthesised} (1)	Allow "needed for growth/building muscle"	(2)
1 (b)(i)	D Vitamin K		(1)
1 (b)(ii)	Two from: {sunlight/uv} on skin (1) {leafy green} vegetables (1) mushrooms (1) milk/butter/dairy (1) (red) meat (1) egg (yolk) (1) liver (1) accept any other reasonable response	allow fortified foods/named examples	(2)
		Total	**7 marks**

Question number	Answer	Additional Guidance	Mark
2 (a)(i)	<table><tr><th>name of organelle</th><th>function of organelle</th></tr><tr><td>80s Ribosome</td><td>protein synthesis</td></tr><tr><td>Nucleus</td><td>contains the chromosomes</td></tr><tr><td>Golgi apparatus</td><td>{packaging/sorting/modifying} proteins</td></tr></table>	accept translation accept description accept transport of lipids accept creation of lysosomes	(3)

2 (a)(ii)	(rough ER) contains ribosomes (1)	ORA	(1)
2 (b)	A active transport C exocytosis		(2)
		Total	**6 marks**

Question number	**Answer**	**Additional Guidance**	**Mark**
3 (a)	Award **1** mark for identification and **1** mark for linked expansion. Up to a maximum of **2** marks for each difference. Any marking point can be an identification or an expansion depending on how the learner has structured their answer. *Passive immunity* antibodies are from external sources/not made by the body / (1) immunity is temporary (1) no memory cells are produced (1) is faster (1) (because) antibodies are present immediately (1) no need for {plasma cells to be made/protein synthesis} (1)	ORA throughout allow named source eg serum/injection allow passive immunity passed on from the mother/ in breast milk/across placenta	(4)

3 (b)	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some or all of the indicative content but learners should be rewarded for other relevant answers. Chemical defences • Acid in the stomach can{destroy/prevent growth of} pathogens in food • Lysozyme and lactic acid in sweat slow down bacterial growth • Tears and saliva and breast milk contain lysozyme • Acid conditions in vagina prevent infection • Detail of action of lysozyme e.g. breaks down (G +ve) bacterial cell walls Physical barriers • Skin acts as a barrier to prevent entry to pathogens • Mucous linings in respiratory tract can produce mucus • (which) traps pathogens • Cilia move and help to remove mucus containing pathogens. • Blood clots/scabs form at injury sites to act as a temporary barrier	Also in macrophages	(6)
		Total	**10 marks**

Mark scheme (award up to 6 marks). Refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–2	• Demonstrates isolated knowledge and understanding, there be major gaps or omissions • Generic statements may be presented rather than linkages being made so that lines of reasoning are not present • Limited explanation which is not logically ordered and with significant gaps.
Level 2	3–4	• Demonstrates mostly accurate knowledge and understanding, with few minor omissions/any gaps or omissions are minor • Some linkages are made so that lines of reasoning are partially present

		• Displays a partially developed explanation that has a structure which is mostly clear, coherent and logical with only minor omissions.
Level 3	5–6	• Demonstrates accurate and thorough/detailed knowledge and understanding • Linkages are consistently made so that lines of reasoning are sustained • Displays a well-developed explanation that has a structure which is clear, coherent and logical.

Question number	Answer	Additional Guidance	Mark
4 (a)	Award **1** mark for identification and **1** mark for linked expansion. Up to a maximum of **4** marks. Any marking point can be an identification or an expansion depending on how the learner has structured their answer. **Increased number of white blood cells** immune response (1) more lymphocytes {produced/made} (1) because of infection (with)/a pathogen (1) OR leukaemia (1) causes overproduction of white blood cells/hyperplasia (1) OR autoimmune disease (1) body is producing white blood cells (in response to its own cells) (1) **Decreased number of red blood cells** lack of iron/anaemia (1) fewer red blood cells able to be made (1) Less oxygen available in the blood /for the body (1) OR destruction of red blood cells/haemolysis (1) by {immune system/white blood cells}/ (1) due to transfusion/blood vessel injury (1) OR lower blood volume (1) caused by loss of fluid/blood/bleeding (1) Accept any other reasonable response.	Ignore references to patient being healthy/unhealthy Allow Inflammation Allow "cancer" allow "rapid" Allow: correct named example Ignore blood clots Allow: autoimmune	(4)

4 (b)	Award **1** mark for identification and **1** mark for linked expansion. Up to a maximum of **2** marks. Any marking point can be an identification or an expansion depending on how the learner has structured their answer. {HIV} attacks/infects T helper cells (1) Due to (CD4) receptors (1) (As HIV replicates) helper T cells are destroyed (1)	Ignore autoimmune allow attacks immune system allow T cells are killed 1 mark for destroying if in context of virus	(2)
4 (c)	(presence of) inflammation/injury (1)	Allow "infection" allow named cause of inflammation e.g. cancer, autoimmune disease, diabetes, obesity, stress, stroke, pregnancy ignore references to diet/blood pressure	(1)
4 (d)	Any one from the following: avoid contact with sharps/needle (1) dispose of biological matter separately (1) use a sterile needle/equipment/workspace (1) sterilise patient's arm before inserting needle (1) Accept any other reasonable response.	accept wear a mask accept use disinfectant/ref to sanitisation ignore goggles/lab coat/apron/tie hair back/ PPE	(1)
		Total	**8 marks**

Question number	Answer	Additional Guidance	Mark
5 (a)(i)	Synthesis/S (phase)		(1)
5 (a)(ii)	Award **1** mark for any of the following, up to a maximum of **3** marks. cell growth (1) protein synthesis occurs (1) volume of cytoplasm increases (1) number of organelles increases (1) mitochondria replicate/divide (1) chromosomes condense/spindle fibres begin to form (1) {chromosomes/DNA} checked for error/mutation (1)	Allow reproduction/division of organelles	(3)
5 (b)(i)	centrosome/centriole(s)	allow phonetic spelling reject centromere	(1)
5 (b)(ii)	A anaphase		(1)
5 (c)	Award **1** mark for identification and **1** mark for linked expansion. Up to a maximum of **2** marks for each difference. Any marking point can be an identification or an expansion depending on how the learner has structured their answer. Meiosis produces four daughter cells (1) Because there is a second division (1) OR Meiosis produces non-identical daughter cells (1) Because of {independent assortment/crossing over}(1) OR Meiosis produces gametes (1) daughter cells have half the number of chromosomes/are haploid (1)	ORA throughout allow responses describing differences within named stages of cell division accept any other reasonable response.	(4)
		Total	10 marks

Question number	Answer	Additional Guidance	Mark
6 (a)(i)	Liver	allow muscles /named muscle	(1)
6 (a)(ii)	glucagon	reject glycogen, glucose accept phonetic spelling	(1)
6 (b)	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some or all of the indicative content but learners should be rewarded for other relevant answers. Type 1 diabetes • Autoimmune • More likely to develop in childhood • beta cells in islets of Langerhans destroyed • pancreas is unable to produce insulin • evidence that there is genetic predisposition • environmental triggers such as viral infection may cause mutations that lead to Type 1 Type 2 diabetes • Metabolic • associated with lifestyle, more likely to develop later in life • linked to obesity, poor diet, sedentary lifestyle • lower amounts of insulin produced • cells may be insulin resistant and not respond to insulin released • evidence for genetic predisposition • some links to medication •		(9)
		Total	11 marks

Mark scheme (award up to 9 marks) refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–3	• Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions. • Few of the points made will be relevant to the context in the question. • Limited discussion that contains generic assertions rather than considering different aspects and the relationship between them.
Level 2	4–6	• Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions. • Some of the points made will be relevant to the context in the question, but the link will not always be clear. • Displays a partially developed discussion that considers some different aspects and some consideration of how they interrelate, but not always in a sustained way.
Level 3	7–9	• Demonstrates mostly accurate and detailed knowledge and understanding. • Most of the points made will be relevant to the context in the question, and there will be clear links. • Displays a well-developed and logical discussion that clearly considers a range of different aspects and how they interrelate, in a sustained way.

Question number	Answer	Additional Guidance	Mark
7 (a)	difference (1) 57 – 42 division (1) $\frac{15}{57}$ evaluation (1) 0.26 x 100 **OR** division (1) $\frac{42}{57}$ multiplication (1) x 100 evaluation (1) 100 – 74	allow full marks for correct answer of 26(%) without working allow any number that rounds to 26 Ecf from difference and from substitution Ignore any - signs allow 2 marks for 74% without working	(3)
7 (b)(i)	Award **1** mark for identification and **2** marks for linked expansions. Up to a maximum of **3** marks. Any marking point can be an identification or an expansion depending on how the learner has structured their answer. NCV faster in myelinated neurones (1) (Myelin sheath) insulates neurone (1) prevents loss of {ions} (1) nodes of Ranvier/gaps in sheath (1) allow for saltatory conduction (1)	ORA Allow ref to speed of impulse/signal Ignore references to heat allow reference to nerve impulse "jumping" (between gaps in the sheath)	(3)
7 (b)(ii)	Award **1** mark for identification and **2** marks for linked expansions. Up to a maximum of **3** marks. Any marking point can be an identification or an expansion depending on how the learner has structured their answer. autoimmune disease (1) {immune system/white blood cells} attack (1)	Ignore body attacks	(3)

	(attack) Schwann cells/ myelin sheath (1) decrease in thickness of myelin/lesions formed (1)	Allow references to damaging/destroying **myelin (sheath)**	
7 (c)(i)	Award **1** mark for any of the following in a logical order. Up to a maximum of **4** marks. receptor (sends signal to) (1) sensory neurone (1) relay neurone/the spinal cord (1) motor neurone (1) (triggers response in) the effector/muscle (1)	Credit any correctly labelled diagrams Ignore: "reflex neurone" throughout Ignore CNS Reject: brain Allow 1 mark for clear description of impulse crossing synapse between neurones	(4)

7 (c)(ii)	C pupils dilating in low light		(1)
		Total	14 marks

Question number	Answer	Additional Guidance	Mark
8 (a)	Two from the following: Blood sample (taken from patient) (1) Blood sample tested against type A and B antibodies (1) Observation for reaction/coagulation (1)	Allow: check antigens on blood cells Accept tests for anti-Rh serum	(2)
8 (b)	Award **1** mark for identification and **2** marks for linked expansions. Up to a maximum of **3** marks. Any marking point can be an identification or an expansion depending on how the learner has structured their answer. mother only has alleles for type O (1) father is heterozygous/have an O allele/is a carrier (1) child has inherited one O allele from each parent (1) child must be homozygous (1)	If MP1 and MP2 not given allow 1 mark for indication of one homozygous **recessive** parent and one heterozygous parent. accept up to 3 marks for a correctly drawn and labelled diagram/ Punnett square	(3)
8 (c)	Answers will be credited according to the learner's demonstration of knowledge and understanding of the material, using the indicative content and levels descriptors below. The indicative content that follows is not prescriptive. Answers may cover some or all of the indicative content but learners should be rewarded for other relevant answers.		(9)

	Chorionic villus sampling • Takes cells/DNA from the placenta • Which have same DNA as fetus • Allows for earlier testing than amniocentesis/11-14 weeks • Allows for testing for genetic/chromosomal disorders • Test must be followed up by a blood test afterwards • Can tell the sex of the fetus earlier than observed with ultrasound Amniocentesis • Needle is inserted through the abdomen and takes a sample of amniotic fluid • To obtain fetal cells (with their DNA) • Testing done when fetus is more developed/15-20 weeks • Can test for genetic/chromosomal disorders • Provides information about neural tube defects • Provides information about chromosomal abnormalities (Down syndrome, Edward's syndrome, Patau's syndrome) conclusion • Increase risk of miscarriage with both tests (risk is same for both) • Risk of infection in both • Risk of sensitisation/rhesus disease (if baby Rh +ve and mother –ve) • Discomfort during and cramps after procedure • Not offered to all pregnant women • Women may be more likely to opt for testing if there is a history of genetic disorders in the family • Some people may be ethically opposed to prenatal testing. • Prenatal testing is optional and does not need to be accepted even if offered • Tests can't check for every single potential disorder • Disorders tested for may depend on family history/the lab that performs the tests.		
		Total	14 marks

Mark scheme (award up to 9 marks). Refer to the guidance on the cover of this document for how to apply levels-based mark schemes*.		
Level	**Mark**	**Descriptor**
Level 0	0	No rewardable material.
Level 1	1–3	• Demonstrates isolated elements of knowledge and understanding, there will be major gaps or omissions. • Few of the points made will be relevant to the context in the question. • Limited evaluation that contains generic assertions, leading to a conclusion that is superficial or unsupported.
Level 2	4–6	• Demonstrates some accurate knowledge and understanding, with only minor gaps or omissions. • Some of the points made will be relevant to the context in the question, but the link will not always be clear. • Displays a partially developed evaluation that considers some different competing points, although not always in detail, leading to a conclusion that is partially supported.
Level 3	7–9	• Demonstrates mostly accurate and thorough/detailed knowledge and understanding. • Most of the points made will be relevant to the context in the question, and there will be clear links. • Displays a developed and logical evaluation that clearly considers different aspects and competing points in detail, leading to a conclusion that is fully supported.

Ofqual

Llywodraeth Cynulliad Cymru
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